TRAFFIC ENGINEERING

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A DIGEST OF CURRENT LITERATURE

ON STREET AND HIGHWAY TRAFFIC

and

NEWS OF THE INSTITUTE OF TRAFFIC ENGINEERS

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157. DISTANCE REQUIRED FOR AUTOS TO OVERTAKE EACH OTHER, Carl P. Nachod, V. Pres., Nachod & U.S. Signal Co.

An example of the use of this chart is drawn on the chart itself:

In a two lane highway, car 1 going at 40 m.p.h. (v_1) is 100 feet back of car 2, going at 30 m.p.h. (v_2), which the driver of car 1 wishes to pass. However, car 1 sees in the distance car 3 coming toward him at 50 m.p.h. (v_3).

Car 1 will require to overtake 2 by 50 feet, so as to be in his own lane again when car 3, going the other way, passes

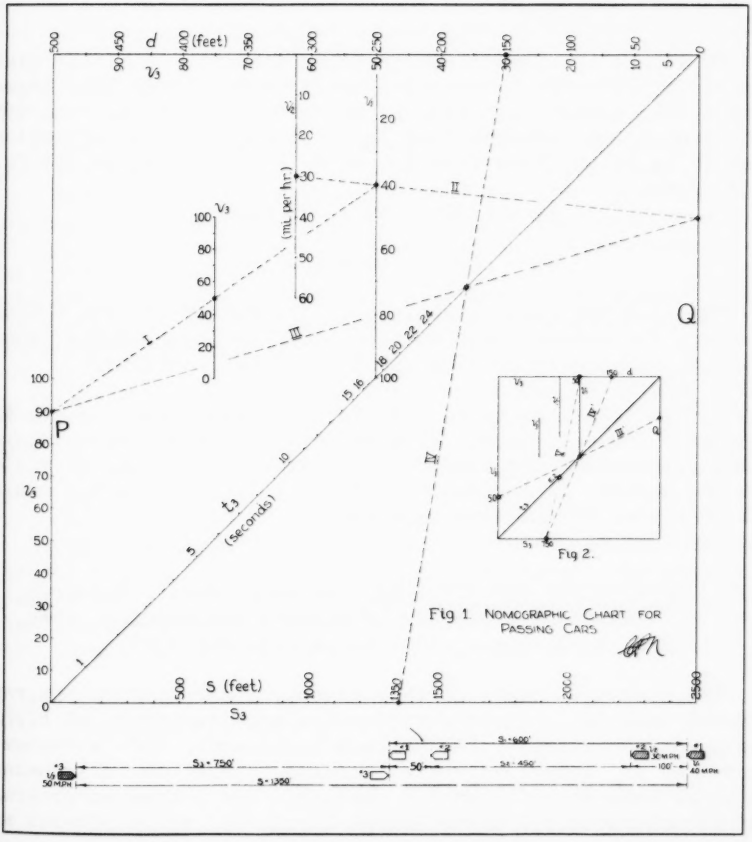

Fig 1. NOMOGRAPHIC CHART FOR PASSING CARS

him. (100+50=150 ft. or d.) How far must car 3 be from car 1 that car 1 may pass car 2 safely? Answer: 1350 ft. (s).

This problem is solved graphically by drawing the four dashed secants, as shown.

Draw secant I from 40 on scale v_1 through 50 on scale v_3, continuing it to cut turning scale P. Draw secant II from 30 on v_2 through 40 on v_1, continuing it to cut turning scale Q. Draw secant III connecting these points on P and Q and intersecting the diagonal turning scale t_3. Draw secant IV from 150 on d thru this intersection, continuing it to s, which it cuts at 1350 ft., the required distance. Each secant cuts 3 scales, the significant intersections being marked with small circles, other intersections being avoided by breaks. Of course, the problem may be stated in other ways, in which case the secants will be drawn in a different order. The speeds are taken as constant for the maneuver. Any other speeds may be assumed, and it will be found that the passing distance s will be decreased if car 2 speeds up and if cars 1 and 3 slacken speed.

To locate all cars at the passing instant, find the distance s_3 traversed by opposing car 3 to reach car 1, by drawing a new secant III from 50 on left scale v_3 to the old point on Q, and intersecting t_3. Through this intersection new IV is to be drawn from 150 on d. This cuts s_3 at 750 ft. Therefore:

$$s_1 = 1350 - 750 = 600 \text{ feet}$$

$$s_2 = 600 - 150 = 450$$

Thus all the cars are placed, the sketch at the bottom showing the several cars section-lined in their initial positions, and merely outlined in their final positions.

To find the time in seconds for this evolution, which is the same for all cars, draw secant V from 50 on v_3 scale that lies across the top of the chart to 750 on the s_3 scale at the bottom of the chart. Where this cuts the t_3 scale at 10.2 sec. is the time required.

158. MODERNIZING OUR HIGHWAYS, Ralph A. Moyer, Research Associate Professor of Highway Engineering, Iowa State College. (Public Safety, May 1939)

The essential parts of this highway modernization program should include: (1) Identification and treatment of high-accident locations; (2) Uniform safeguards and warnings, provided at locations where hazards cannot be eliminated readily because of economic reasons; (3) A planned program of reconstruction, using design standards which provide an

adequate margin of safety.

Identification and treatment of high accident locations is the first job from the standpoint of safety.

Traffic engineering safeguards and warnings should be provided as the second part of the highway modernization program. Included in the needed system of safeguards and warnings are: (1) A uniformly engineered system of speed zones; (2) Uniformly established no-passing zones; (3) Larger warning, slow and other types of signs placed with more regard to being seen and heeded by drivers; (4) Other standard traffic control devices, installed so as to avoid unnecessary restrictions.

The program of reconstruction and new construction should be based on facts, so that we may get the most safety per dollar.

Maximum safety requires many changes in the design standards for rural highways. Highways should be designed for uniform speeds. That is, curvature, sight distance, roadway widths and super-elevation should be uniform in relation to the design speed for a particular type of highway. It will be desirable also to provide for a uniform factor of safety so that motorists may reasonably expect the same margin of safety at all locations.

Side-slopes of four to one and back slopes of three to one are important safety features of the modern highway. These flat slopes allow a car to run into a ditch and back onto the roadway without danger of rolling over. The greater widths of right of way required to accomplish this make driving less fatiguing and provide greatly improved visibility at road intersections, farm drives and field entrances. Non-collision accidents are one of the most important types of rural road accidents in Mid-western states.

R. E. Toms, chief of the Division of Design of the Bureau of Public Roads, said recently that highways should be designed with two minimum sight distances: One to accommodate passing of motor vehicles with safety, and one to be considered a non-passing minimum.

Traffic behavior studies made as a part of the Michigan highway planning survey show that the higher the speed the greater is the demand for pavement edge clearance and for clearance when passing other vehicles. Modern two-lane highways should have traffic lanes at least 12 feet in width.

159. MICHIGAN CITIES AUTHORIZED TO FINANCE PARKING SPACE, (American City, May 1939)

A new Michigan law allowing cities to issue revenue bonds to finance the purchase or construction of municipal parking

facilities is the first law of its kind to be enacted by any state, the American Society of Planning Officials reports. The law places the operation of parking lots or other facilities on the same status, with regard to revenue bonds, as sewage disposal,water supply or any other municipal activity financed by such bonds. Bonds of this type must be retired from earnings of the project for which they are issued.

Michigan's Legislature enacted the law at the request of the city of Battle Creek,which had sought a federal grant to assist in construction of a $220,000 overhead parking structure. Public Works Administration officials doubted the legality of a revenue bond issue to finance the city's share of the cost, and the Legislature amended an existing law to make bonds issued for this purpose legal.

The Legislature's action was significant in that it provided a way for construction and operation of permanent park ing areas, planning officials believe.There is also the possibility that parking charges may be lowered under public ownership, once the financing bonds are retired.

At least 35 cities in the country own municipal parking lots. Most of them spend little money on the lots, and ordinarily no attendants are supplied.

160. ECONOMIC VALUE OF TRAFFIC ENGINEERING. D. Grant Mickle, Manager, Traffic Planning Dept., Jensen, Bowen and Farrell. (Civil Engineering, May 1939)

The field of traffic engineering is broadening immensely, and with it the point of view of the traffic engineer. Only a few years ago,it seemed that his chief function was merely to deal with disorganization and friction in traffic movement. But today he must recognize that his thoughts and methods of attack must include the fundamental causes of which traffic troubles are but symptoms.

In a report of traffic conditions in Toledo, Ohio, ("Traffic Planning Report--Toledo, Ohio," Jensen, Bowen and Farrell, Engineers), it was shown that public expenditures for services designed to cope with traffic accident losses were not at all in proportion to the amount of such losses. More than two dollars was allotted to the fire department for each dollar of actual fire loss, while only 34 cents was spent for traffic control and betterment services for each dollar of traffic damage loss. This example indicates a lack of official appreciation of magnitude of traffic losses and a lag in the public effort to cope with them.

The real causes of accidents, as well as of other con-

flicts and congestion on the roadways, are usually of such a fundamental nature that their correction is costly, and the specific benefits from any particular expenditure are often intangible.

A survey of street traffic conditions in Detroit, "Street Traffic--Detroit" (Michigan State Highway Department), illustrates the various phases of high original cost and eventual effectiveness and economy which are involved in a thoroughgoing attack on basic factors of traffic congestion and accident occurrence in a great city.

The economic value of traffic engineering in dealing with physical situations cannot be questioned. Land values are largely dependent upon accessibility. Accessibility is dependent, to a considerable degree, on the travel habits of people as well as on the physical layout and structure of streets and transportation facilities. Much has been said about street capacity for the movement of automobiles. The capacity of a street, however, is not the true measure of the potential shopping and travel habits of the people. No area is likely to attract its full quota of day-time population under conditions which exist when traffic lanes approach capacity values.

Traffic engineering is proving equally useful to the high way administrator and to the traffic enforcement officer.Cooperative assistance to these officials is not always confined to the solution of problems of traffic. It may be, and often is, applied to problems of highway finance and to details of police procedure.

Enforcement agencies complain of inadequate personnel. Traffic Engineering, through selective enforcement, points the way for more efficient use of officers.

Traffic improvement involves the use of engineering, education and enforcement. Of these three methods, the first-engineering-is the most effective, the most permanent, and the most costly. The second-education-is the most ethically desirable, but the most indirect and, for some individuals and classes, the least effective. The third-enforcement-probably will always be necessary to make up for the deficiencies of the other two methods and to handle the recalcitrant individuals--who in traffic matters as in everything else,are always present.

The traffic engineers activities, and the acceptance of the essential character of his services, will be based in the future, as they have been in the past, on the economic value of these services to the community. In our specialized economic society in which highway transportation is the great integrating and correlating element.

161. HERE'S HOW THEY DID IT--PROVIDENCE. Ralph W. Eaton, City Traffic Engineer, Providence, Rhode Island (Public Safety, May 1939)

Some remarkable things happened last year in Providence, R.I.

Traffic deaths dropped from 41 in 1937 to 16--a 60% cut.
Traffic accidents involving personal injury dropped 42%.
The city's drivers and pedestrians collaborated to establish for Providence a record of 111 days without a single traffic death, or 28,372,000 deathless man-days.
The traffic death rate sank to a new low for big cities--6.3 per 100,000 population.
Standard automobile liability insurance rates dropped more than 20%.

In recognition of these achievements, Providence was named by the National Safety Council the Grand Award Winner among all cities participating in the 1938 National Traffic Safety Contest.

The stop-speeding campaign was based on three things:

(1) It was to continue six months, to avoid any idea that it was to be a short, spasmodic effort.
(2) A special officer, to outrank any captain, was appointed by the chief of police to head the no-speeding drive.
(3) The public was to be informed promptly and frequently on the progress of the campaign in terms of savings in lives and the prevention of injuries.

162. RURAL HIGHWAY GRADE INTERSECTION LAYOUTS AND SPECIAL SIGNS. Discussion given by C. P. Taylor (Rural Traffic Problems, Highway Research Board)

Heavy volumes of thru-traffic can be moved efficiently thru cross intersections; but, these intersections often prove to be accident prone. The opportunity for motorists to drive over the crossing at high speed and the possibility of obstructions to view on the corners makes these types of intersections more dangerous, perhaps, than might be expected.

Off-set types of intersections while suitable for passing heavy volumes of traffic over the thru-street, seldom can do as well by the road which is off-set, because of the "S" turn movement. However, this turning movement has an important advantage if the thru-street is a main highway and the off-set street a minor road. In such cases the traffic must slow down

before entering the main thorofare.

"T" intersections, singly, or a distance apart in pairs so as form very long off-set types of intersections, seem to have about the same advantages and disadvantages as the off-set intersections. There is, however, the added problem-where traffic via a pair of "Ts" is heavy, of adequately providing for the combined volume of it and the main thorofare over the distance the two run together.

Forks and "Ys" are capable of moving large volumes of traffic smoothly, but seldom is there any restraining feature to force drivers to slow down in passing thru the intersection. In a "Y" intersection unless the angle is very flat, a clear view is obtained of each of the three entering ways. At forked intersections, the problem of the flat-angle may be more pronounced and therefore, the source of some hazard. A right fork is suitable for a one-way street...out, and a left fork, for a one-way street...in.

Signalization of "T" and "Y" or forked intersections is a relatively simple matter when the left turn out of the branch only is heavy. It is a much greater problem when the left turn into the branch is heavy or when both left turns are heavy. In such cases it generally is necessary to have recourse to three-phase controllers or to special trick move ment.

The major principle, for the working out of any particular island design, is,of course, to adapt it to the existing, or, anticipated traffic pattern. It is also important to streamline it, so that there will be no unnecessary corners or projections with which venicles may collide.

Roundabouts provide one method for controlling side-street traffic without resorting to control signals, or signs, and without unduly distrubing the movement of traffic along the main thorofare. They work out best on roadways having a center strip. A hundred feet is generally considered a minimum for weaving distance from the entrance of the side street to the end of the roundabout.

One of the things that makes the roundabout quite unsatisfactory on a high-speed road is that the thru traffic is favored to such an extent that it does not slow down, or in any other way give entering traffic equitable consideration for access into the main highway.

The great advantage of the circle lies in its ability to unscramble large quantities of turning-movements with little or no delay and no inconvenience to any particular traffic stream.

163. AN ENGINEERING APPROACH TO TRAFFIC SAFETY. Walter H. Klapproth, District Traffic Engineer, Ill. Division of Highways. (Presented at Rock River Valley Safety Conference, April 27, 1939)

Present day traffic demands an adequate engineering organization to perform the duties relating to the design, construction, maintenance and operation of a modern system of streets and highways.

The Illinois Division of Highways is now entering the third year of a comprehensive speed study in Chicago metropolitan area. This study is being conducted to determine the speed practices of motorists in all types of zones correlated with the accident experience. To date we have found that most motorists travel at reasonable rates of speed which are consistent with physical conditions along the street of highway and in accordance with the perceptible hazards. It has also been found that twenty to twenty-five miles per hour speed limits are observed by fewer motorists than twenty-five to thirty-five miles per hour limits. We are still looking for the street where everybody travels at speeds from fifty to sixty miles per hour.

Visibility or sight distance, is the most important consideration in highway design. If accidents are to be reduced adequate sight distances must be provided. We can no longer use our former arbitrarily established sight distance limit of five hundred feet. Quite recently there has been introduced in highway design the idea of a dual sight distance minimum. One of these is designed to accommodate the passing of vehicles with safety over a vertical curve, the other is considered a no-passing minimum. In four lane construction sight distance over a vertical curve needs only to conform to the no-passing minimum standard adopted. Instead of five hundred feet sight distance we now find highways being designed with a minimum sight distance of seven hundred fifty feet in hilly country and nearly one thousand feet in more level sections. Safe passing sight distances have been stepped upward to seventeen hundred and twenty-two hundred feet in hilly and level country respectively. More thought is now being given to the concentration of expenditures on safe passing sections than spreading them over the entire highway.

I have tried to indicate to you some of the new developments in highway design which relate to traffic safety and the wide-spread interest of the traffic engineer in the investigation, analysis and placing into effect of traffic control and facilitation measures relating to traffic safety which are based upon proven engineering principles.

NEWS ABOUT THE TRAFFIC ENGINEERING PROFESSION

MID-WEST SAFETY CONFERENCE, The 17th Annual Mid-West Safety Conference was held in Chicago May 9 to 11 inclusive, under the auspices of the Greater Chicago Safety Council, the Institute of Traffic Engineers, and several other organizations. The Institute was responsible for the development and direction of the three Public Safety Sessions.

Among those Institute members who took part in the program were W. H. Klapproth, W. F. Milner, Guy Kelcey, Roger Morrison, Howard F. Ilgner, Rufus Jasper, William R. McConochie, Harry H. Harrison.

One of the highlights of the Conference was the Public Safety Luncheon sponsored by the Institute. Leslie J. Sorenson, City Traffic Engineer of Chicago and President of the Institute of Traffic Engineers, presided. Hawley S. Simpson, Vice President of the Institute, in the absence of Burton W. Marsh, gave the principle address, entitled "Off the Job Accidents."

Credit for arranging this excellent program goes to Mr. William R. Abbott, member of the Institute.

SPECIAL BOARD OF DIRECTION MEETING. The Board of Direction held a special meeting in Chicago on May 10, during the Mid-West Safety Conference. Among the many important items covered were progress reports submitted by 22 of the 24 ITE committees. The Board approved the program for the Annual Convention to be held in Atlantic City, New Jersey; the outline submitted by the Research Committee; special 90 day sale of back issues of PROCEEDINGS; design submitted for ITE pin; the acceptance of 11 new members.

PROGRESS REPORTS OF COMMITTEES. Those committees submitting progress reports to the Board of Direction at its Special Meeting in Chicago, May 10 were as follows:

Definition of a Traffic Engineer	A.H.Vey, Chairman
Editing of Proceedings	W.R.McConochie
Finance and Auditing	W.G.Cole
Library	B.D.Greenshields
Membership	G.W.Barton
Nominating	A.H.Vey
Policy	C.H.Rex
Program	D.M.McCracken

N.Y. Regional Meeting	H.S.Simpson, Chairman
Public Relations	H.S.Simpson
Publications	P.L.Green
Research	Miller McClintock
Special Street Lighting	H.F.Ilgner
Traffic Engineering Training	R.L.Morrison
Proceedings Sales Promotion	W.F.Rosenwald
Ways and Means	B.W.Marsh
Advisory Com., Center for Safety Education, N.Y.U.	W.G.Cole, Represent.
Highway Research Board	L.W.McIntyre
Motion Picture Traffic Safety	L.J.Sorenson
Sectional Com., ASA-D 7	D.M.McCracken
Traffic Control Com.,A.P.W.A.	B.W.Marsh
Traffic Standards Com, ASA	A.H.Vey

All of these point toward excellent committee work this summer and worthwhile committee reports for the Annual Convention in October.

DEFINITION OF A TRAFFIC ENGINEER. Based on the recent action of the Board of Direction, the Institute members will soon be requested to vote on the definition of a traffic engineer. Below is a copy of the definition as prepared by a special committee under the chairmanship of Arnold H. Vey.

> "Traffic Engineering consists in the conception and application of engineering principles to the regulation and control of traffic along public thoroughfares through the use of design principles and control measures to increase safety and utility."

INITIATION FEE TO BE INCREASED. A recent business meeting of the Institute membership approved the Boards action last fall to raise the initiation fee for affiliate and member grades from $10.00 to $15.00. This raise does not affect either the junior or associate initiation fees. They remain at $5.00 and $10.00 respectively.A ballot will be sent soon to all members qualified to vote asking for their approval or disapproval of this increase in initiation fees.

LEWIS W. McIntyre. "Election of Lewis W. McIntyre as president of the Pittsburgh section of the American Society of Civil Engineers was announced recently.

"Mr. McIntyre, executive vice president and manager of the Pittsburgh Motor Club, was professor of civil engineering at the University of Pittsburgh and later city traffic engineer. He is a past president of the Institute of Traffic Engineers a national organization."

NEW MEMBERS AND TRANSFERS. The Institute of Traffic Engineers welcomes the following new members and congratulates the three associate members receiving full membership:

Name and Address	Board Action
J. Stannard Baker, Ass't Traffic Engineer National Safety Council Chicago, Illinois	Associate
John Beakey, Traffic Engineer Oregon State Highway Department Salem, Oregon	Member
Verle C. Crawley, Dist. Traffic Engineer Illinois Division of Highways East St. Louis, Illinois	Associate
James E. P. Darrell, Senior Engineer Minnesota Highway Department St. Paul, Minnesota	Associate
Wortham W. Dibble, Ass't Traffic Engineer South Carolina Highway Department Columbia, South Carolina	Junior
Rufus G. Jasper, Ass't Traffic Engineer National Safety Council Chicago, Illinois	Associate
E. Emmett Kirwan, City Traffic Engineer Louisville Kentucky	Junior
Ernest H. Miller, City Traffic Engineer South Bend Indiana	Junior
H. Bruce Murray, Dist. Traffic Engineer State Department of Highways Philadelphia, Pennsylvania	Junior
George A. Reid Safety & Traffic Control Engineer State Highway Commission Topeka, Kansas	Associate
Paul L. Ristroph, Traffic Engineer New Orleans Louisiana	Associate

NOTE: Please cut this page out and paste it in your Membership Roster.

TRANSFERS:

Name and Address	Board Action
Harry H. Harrison, Traffic Engineer State Division of Highways Springfield, Illinois	Member
Harry C. Koch, Assoc. Traffic Engineer Room 206, Police Headquarters Detroit, Michigan	Member
William R. McConochie, Traffic Engineer Chicago Surface Lines Chicago, Illinois	Member

NEW ITE PINS. Following requests from many members, the Board voted to have an ITE pin and approved the design submitted. A special announcement and order blank will be sent to all Institute members in the near future urging them to purchase this pin. The price of the pin will be $1.50.

The pin will be round, about the size of a penny. The letters I T E will be gold raised on a blue hard fired french enamel back. It will be available with either safety catch or screw button back attachment, and perhaps as a key.

EIGHT OUT OF NINE. (Transit Journal, April 1939). "We are very busy at this writing in being impressed with the work being done by traffic engineers. Of the nine cities awarded top prizes last year in the safety contest conducted by the National Safety Council, the first eight were ones where traffic engineers were retained. We think that is a pretty good showing when you consider that only half the large cities in the country have traffic engineers. It is the more remarkable, too, when we remember that fifteen years ago a traffic engineer was regarded in about the same light as a Hindu mystic, an alchemist, or a student of relativity. This concept of the mysteries of moving vehicles and people was really the result of two things--the fact that no one knew what it was all about, and that engineers in general had little or no use for these new upstarts who were assuming the title of engineer for something which the former felt wasn't engineering at all. Of late, howerer, traffic engineers have begun to come into their own. Trained men have come forth periodically from the Bureau for Street Traffic Research, and more and more cities are recognizing that traffic engineering, is as much a science as automotive engineering, electrical engineering or aeronautical engineering. The results speak for themselves. You can't laugh off eight first prizes out of nine!"

INSTITUTE OF TRAFFIC ENGINEERS

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THE OBJECTIVES OF THE INSTITUTE

The objects of the Institute shall be the advancement of the art and science of traffic engineering, the fostering of traffic engineering education, the stimulation of original research in traffic engineering, the professional improvement of its members, the encouragement of intercourse between men with mutual interests in traffic engineering, and the establishment of a central point of reference and union for its members. (Article I, Section 4 of the Constitution of the INSTITUTE OF TRAFFIC ENGINEERING).

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